



NAVAIR Process Resource Team

**Broadening the Ability to Train and Launch
Effective Engineering and Service Teams**

Sep 2011

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Agenda

- NAVAIR
- TPI Implementation
- Process Modeling
- TPI and Beyond!
- NAVAIR Team Performance
- Things to Remember



NAVAIR

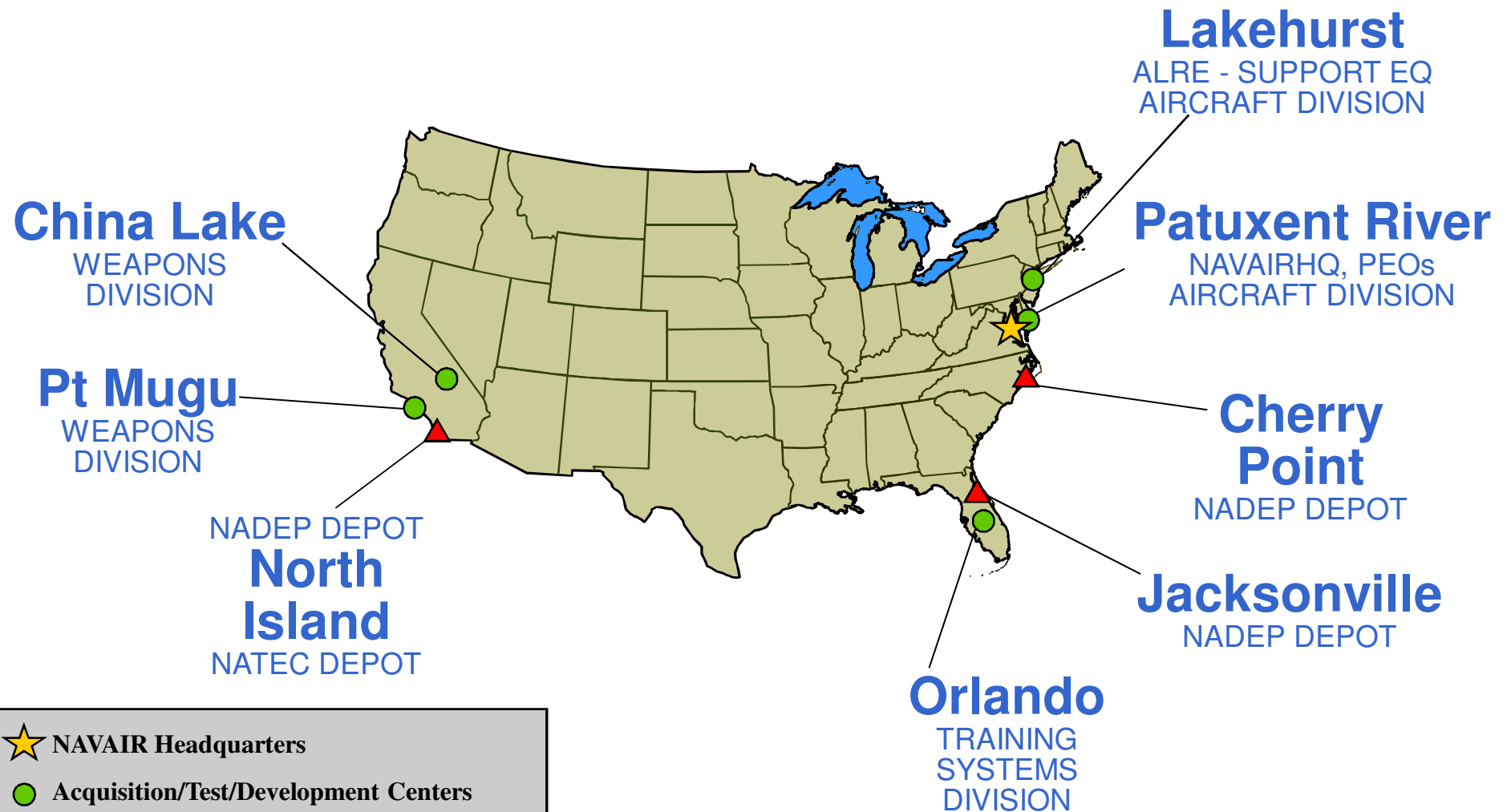


What is NAVAIR?

- NAVAIR is the **Naval Air Systems Command**
- Develop, acquire, and support the **aircraft** and related **weapons** systems used by **U.S. Navy and Marine Corps**
- Our **goal is to provide the fleet with quality products** that are both **affordable** and **available** when most **needed**
- Our support extends across the **entire life span** of a product, including all **upgrades and modifications** to that product



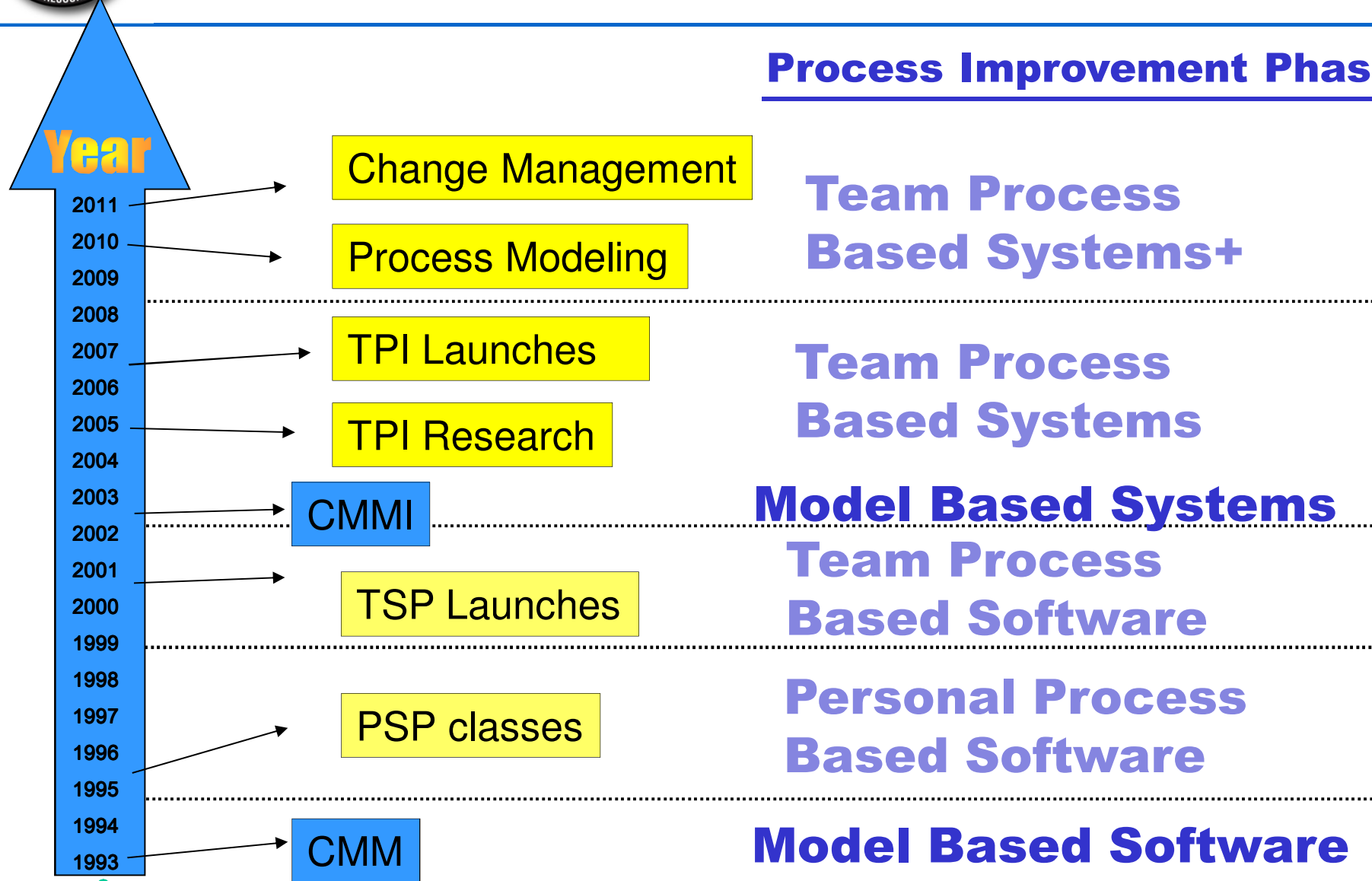
Where is NAVAIR?





NAVAIR PI History

Process Improvement Phase





TPI Implementation



Models and Processes

Capability Maturity Models:

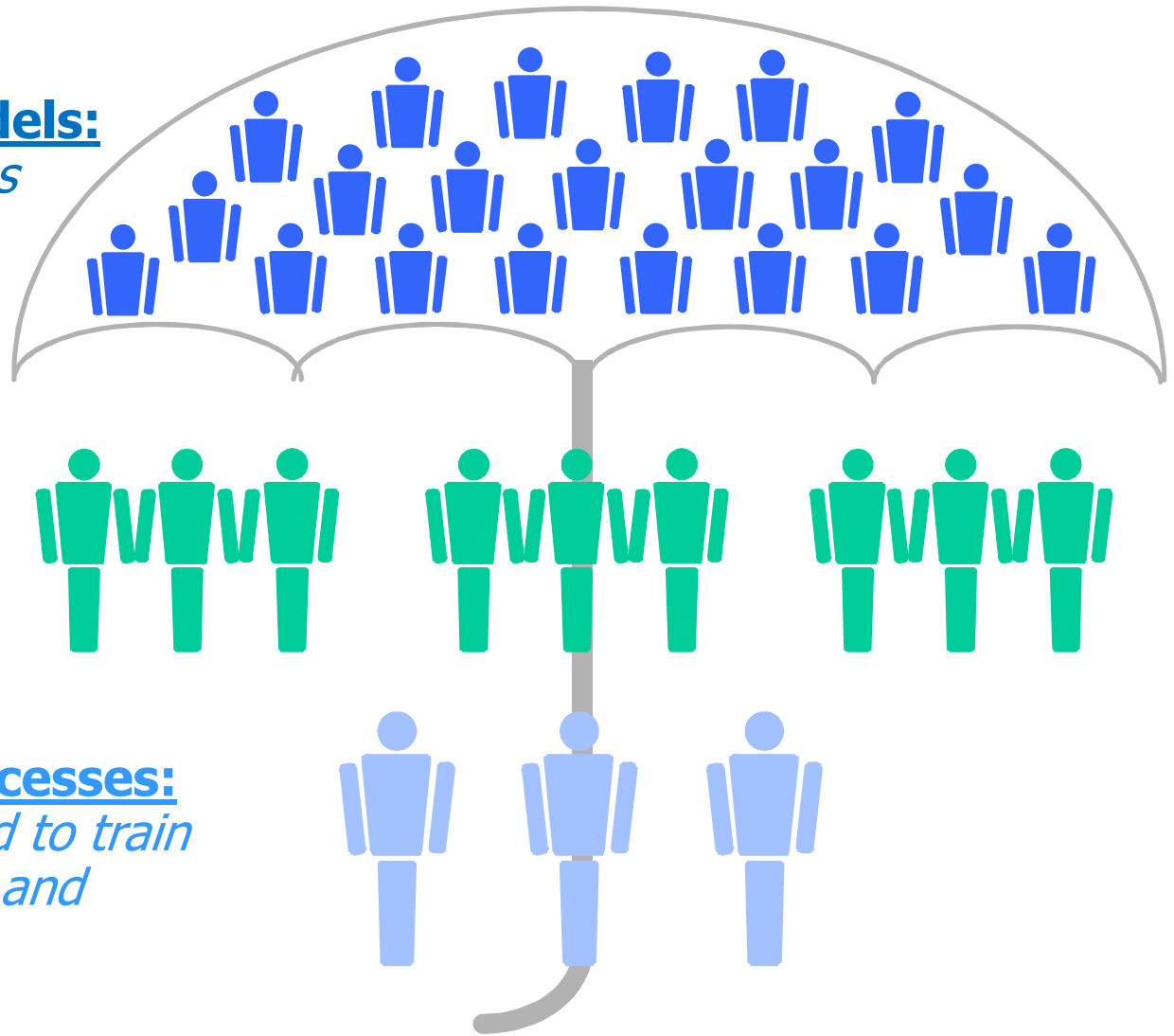
Reference for organizations building process capability

Team Processes:

Processes for teams building quality products on cost and schedule

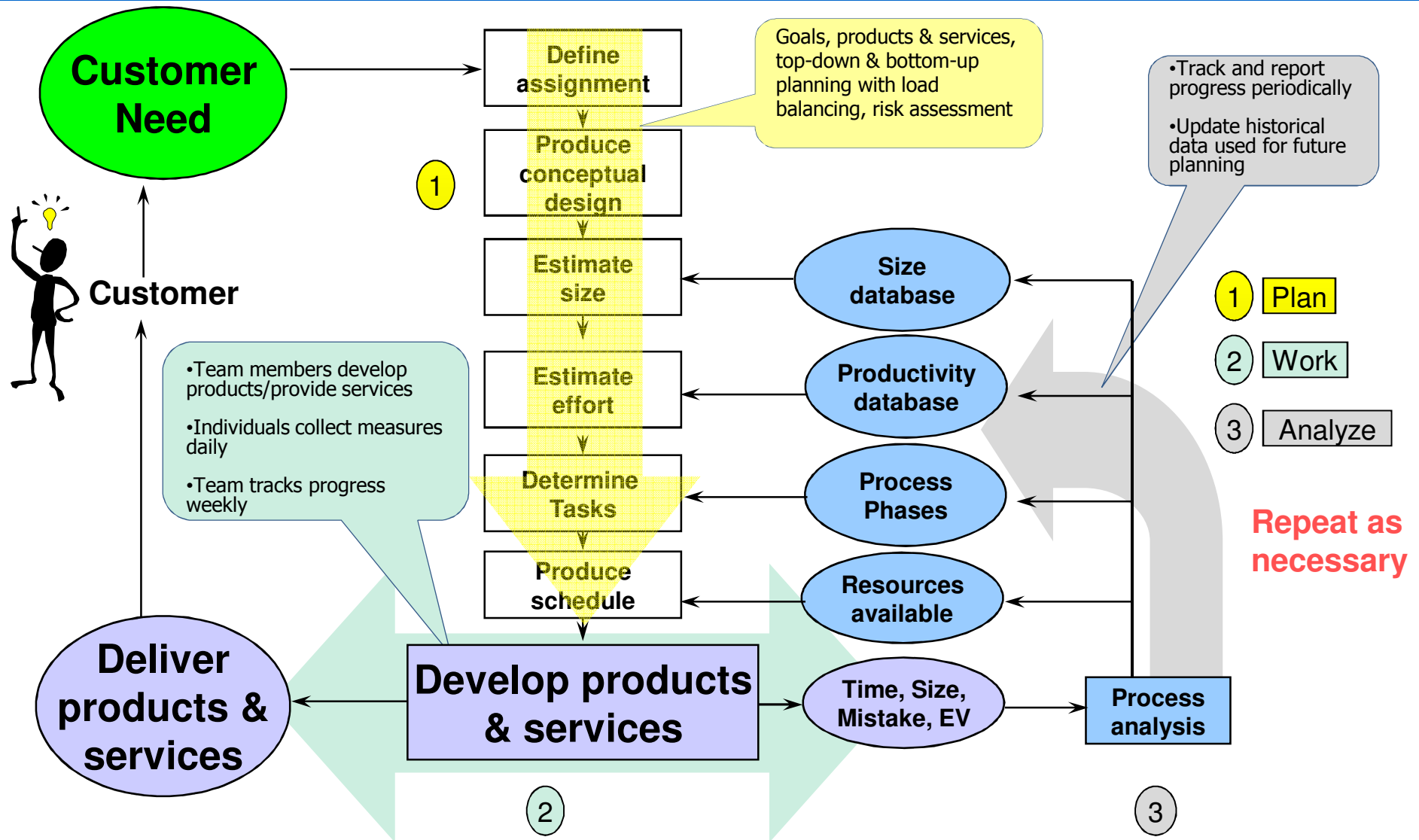
Personal Processes:

Processes used to train individual skill and discipline





Key Team Process Framework





Team Process Elements

Phase	Purpose	To make you in developing module-level resources
1	Inputs Required	Problem description PSP project plan summary form Time and defect recording logs Defect type standard <i>Stop watch (optional)</i>
2	Planning	- Produce or obtain a requirements statement. - Estimate the required development time. - Enter the plan data in the project plan summary form. - <i>Complete the time log.</i>
3	Development	- Design the program. - Implement the design. - Compile the program and fix and log all defects found. - Test the program and fix and log all defects found. - <i>Complete the time recording log.</i>
4	Postmortem	- Complete the project plan summary form with actual time, defect, and size data.
5	Exit Criteria	- A thoroughly tested program - Completed project plan summary with estimated and actual data - Completed defect and time logs

Scripts

Document the process entry criteria, phases/steps, and exit criteria. The purpose is to **guide** you as you use the process.



Measures

Measure the process and the product. They provide insight into how the process is working and the **status** of the work.

Student _____	Date _____
Program _____	Program # _____
Instructor _____	Language _____
Summary	
LOC/line _____	Plan _____ Actual _____ To Date _____
Actual Time _____	
Planned Time _____	
CPU/Cost Performance Index _____	
% Ratio _____	
% New Ratio _____	
Test Defects/LOC _____	
Total Defects/LOC _____	
Yield % _____	
% Approval CDD _____	
% Failure CDD _____	
CDD at Run _____	
Program Size (LOCs)	
Initial (I) _____	Plan _____ Actual _____ To Date _____
Modified (M) _____	
Added (A) _____	
Removed (R) _____	
Total New & Changed (N) _____	
Total LOC (T) _____	
Total New Revised _____	
Total Object LOC (O) _____	
Upper Production Rate (U) _____	
Lower Production Rate (L) _____	
Time in Phase (min.)	
Planning _____	Plan _____ Actual _____ To Date _____ % _____
Design _____	
Design review _____	
Code _____	
Code review _____	
Compile _____	
Test _____	
Postmortem _____	
Total _____	
Total Time (T) (70%) _____	
Total Time (L) (70%) _____	

Forms, Logs, Charts (paperless)

Provide a **convenient and consistent framework** for gathering, retaining, viewing data



Standards

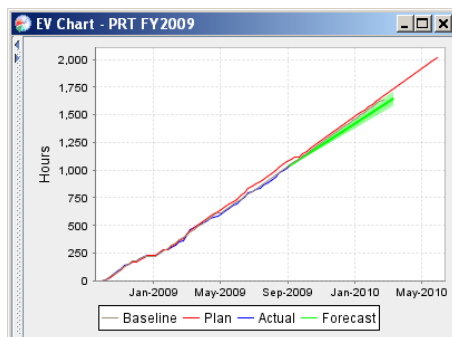
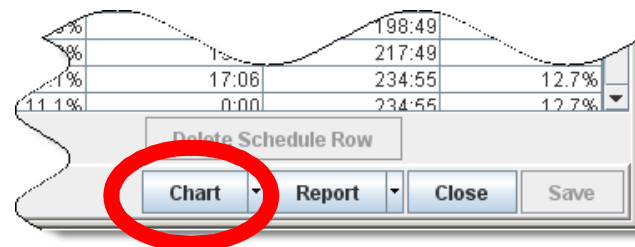
Provide consistent **definitions** that guide the **work** and gathering of **data**.



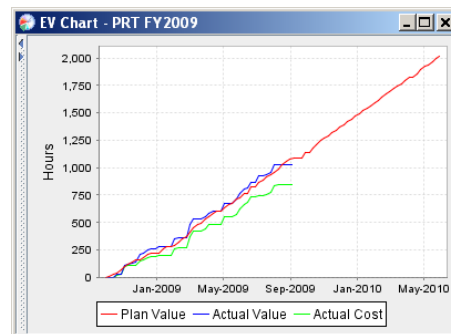
Team Measures and Metrics

- Each team member gathers four basic measures
 - Times
 - Sizes
 - Mistakes
 - Task completion dates

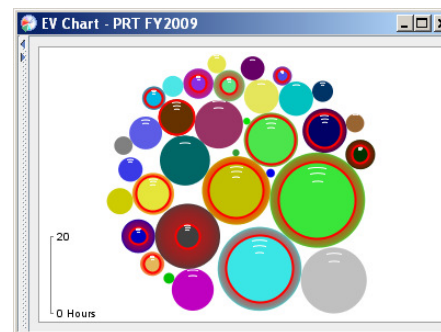
Charts and tables of project metrics are available (updated in real time)



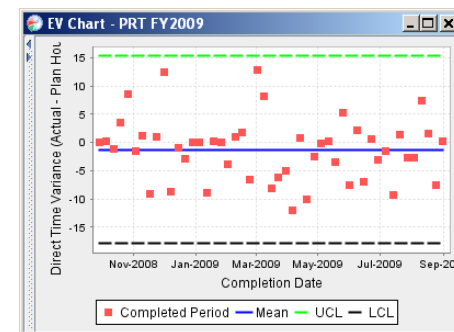
Direct Hours



Earned Value



Tasks in Progress



many more...



NAVAIR TPI

- Success of software teams using TSP led their organizations to ask for same performance on other teams
 - Worked with the SEI to develop approach
 - Based on same TSP fundamental principles
- NAVAIR approach has become TPI for all teams
 - Teams plan all work from first launch forward
 - Work is based on all products and services defined in process modeling
 - PSP for Engineers training planned as part of project if appropriate



Evolution of the TPI Approach

- Training has become just-in-time
- Teams immediately begin to define quality for themselves
 - Log mistakes during first cycle
 - First postmortem analysis of mistakes leads to identification of mistake types
 - Second launch will begin the application of mistake types
- Explicit process modeling techniques added prior to launch
 - Better supports team's unique measurement framework
 - Enables team ability to establish firm foothold on planning and tracking

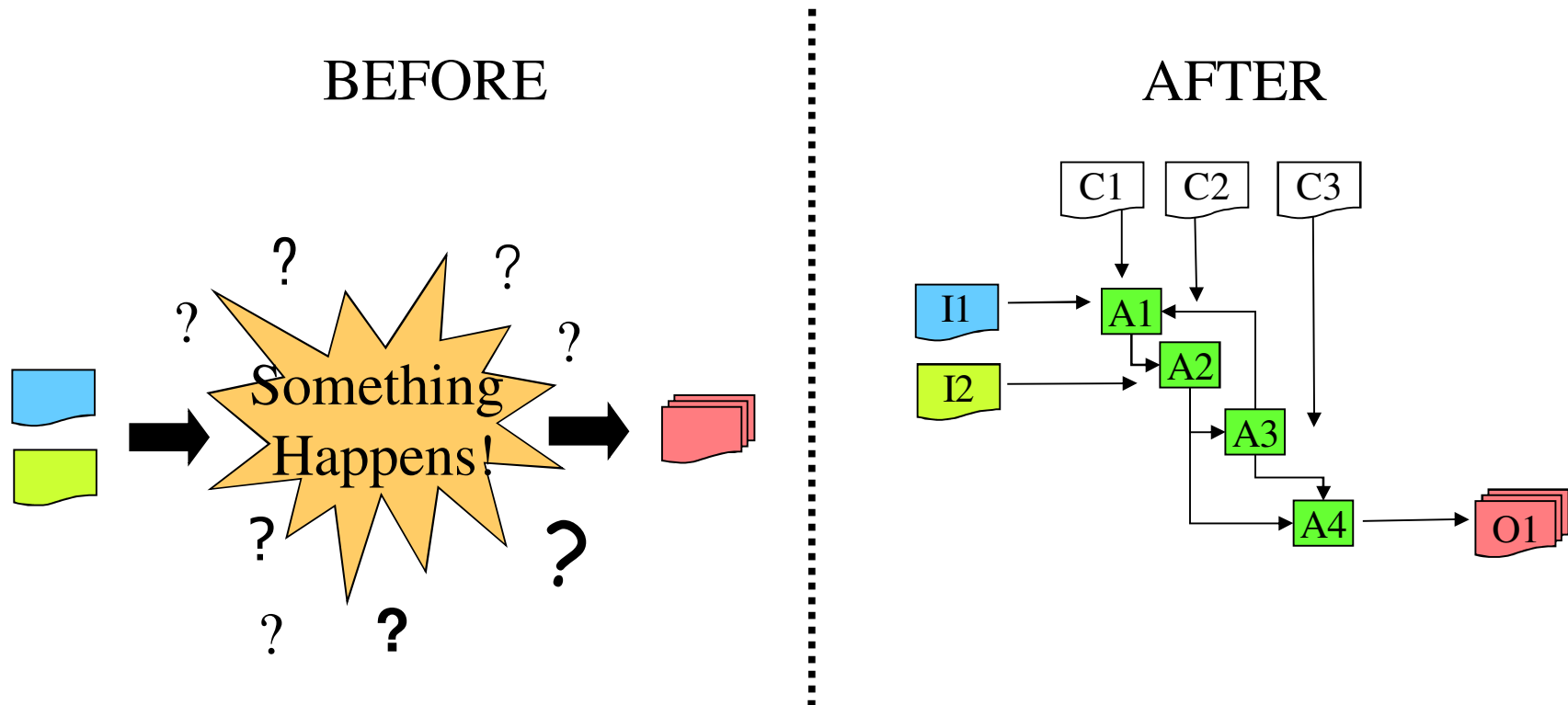


Process Modeling



Process Modeling

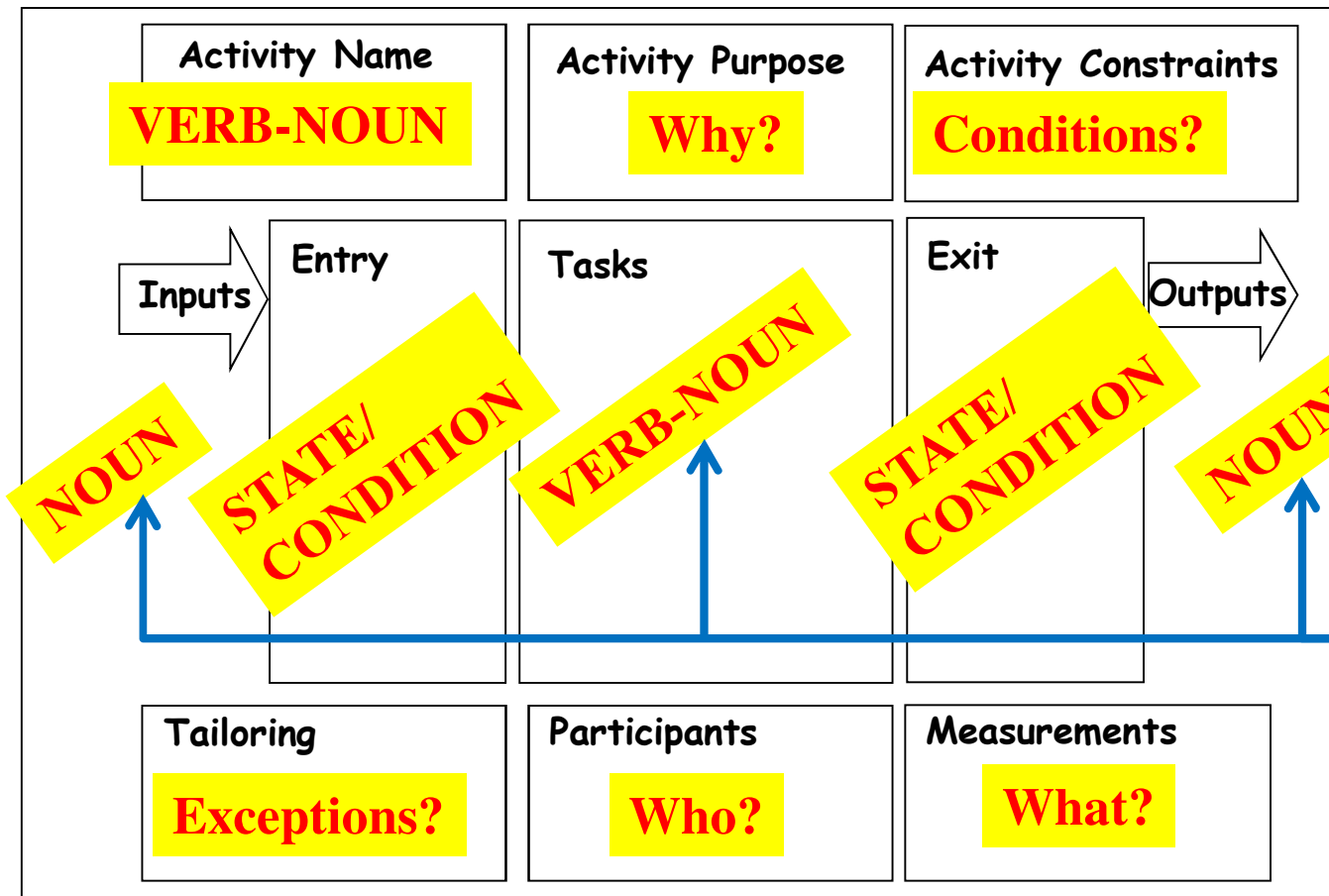
- Method for describing processes
 - Existing “as is” processes
 - Desired “to be” processes





Process Modeling

Each field captures certain aspects of the process activity



The nouns and verbs identified here become key in the definition of the life cycle models unique to each team



Scripted Process Results

- Given to team for peer review prior to launch
- Reviewed by team in launch for quality removal potential
- Maintainable process artifacts post launch

Process Name: Perform Ground Testing

Purpose	- Verify performance of system under test in aircraft in safe ground environment	
Controls	- Constraint aircraft available - Test plan - 3960 - TECT	
Tailoring	- Xpdr testing	
Participants	- Test Engineers - MX support - Aircrew - Contractors (Bell, NG) - PMA	
Measurements	- Test coordinators spreadsheets - CM data base metrics	
Inputs	- Test procedures (from CM) - Aircraft mod package - Aircraft configuration - GSE Licenses and Certs - Fly Me - Weekly aircraft schedule	
Entry Criteria	- Ensure required hardware is installed - Ensure test equipment available - Ensure aircraft is available - Coordinate ground turn if required - Coordinate capture carry article if required - Coordinate with test coordinator	
General	- N/A	
Step	Activities	Description (details)
1	Check in with QA maintenance	- TBD
2	Perform aircraft setup ground test procedures	- TBD
3	Run procedures	- TBD
4	Redline procedures	- Verify repeatable conditions - Check out QA and maintenance - Create TAR
Exit Criteria	- Results exist for each test point - TAR created - MAE signed	
Outputs	- Performed Test - TAR# - Redlined procedures - Notes and data for SARs - Test event data	



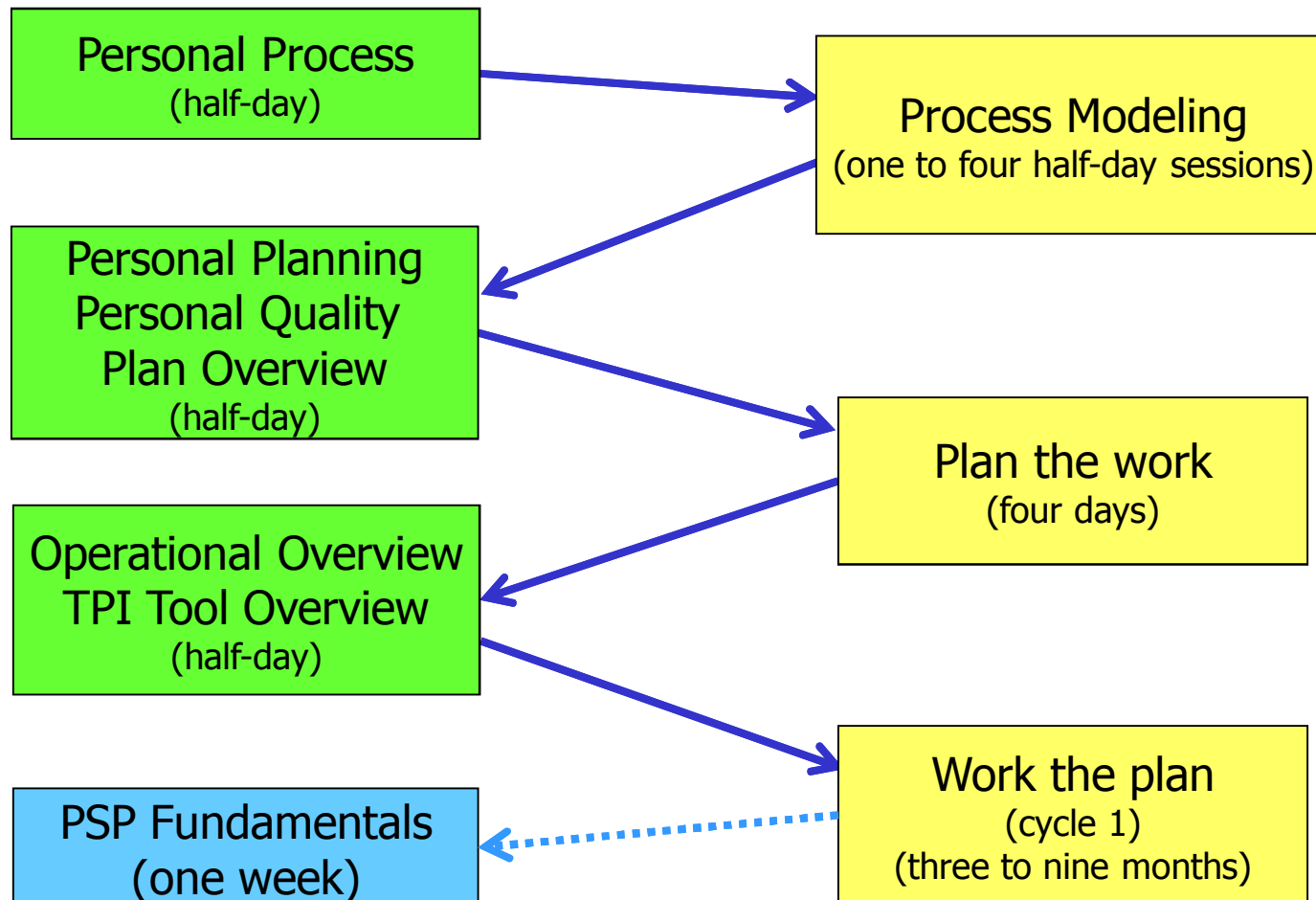
TPI And Beyond!



Just-in-Time TPI Training

Learning

Doing



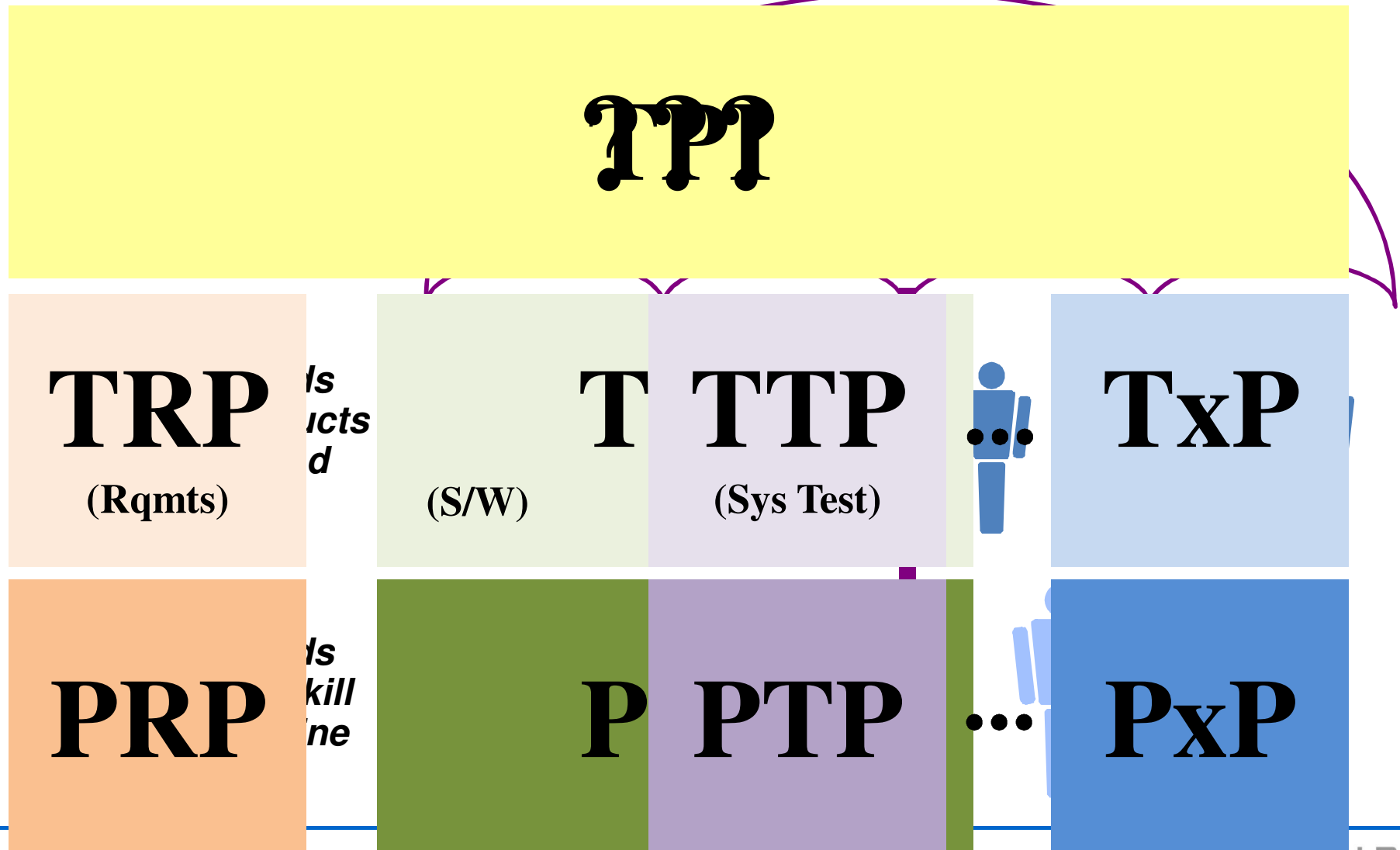


TPI **Pluses** & **Minuses**

- + A detailed plan!
- + Ability to track progress (weekly)
- + Improved estimating (over cycles)
- No mature processes
 - “Where do we put defect removal phases?”
- No defect type standards
 - “How do we populate Review Checklists?”
- No quality planning
 - “Will our plan produce a good product?”
 - No quality indicators (e.g., A/FR)



CMMI, TSP & PDP Relationship



CMMI

TPI

TRP

(Rqm ts)

TSP

(S/W)

TTP

(Sys Test)

...

T_xP

PRP

PSP

PTP

...

P_xP



TPI is Only a Waypoint

- TPI teams will hit a glass ceiling
- TPI teams need to evolve to achieve TSP-like performance (become a TxP team)
- What else does a TPI team have to do in order to become a TxP team?
- ***What does a TSP team do?***



What Does a TSP Team Do?

(Plan the Work)

(Work the Plan)

(Analyze the Data)

Launch

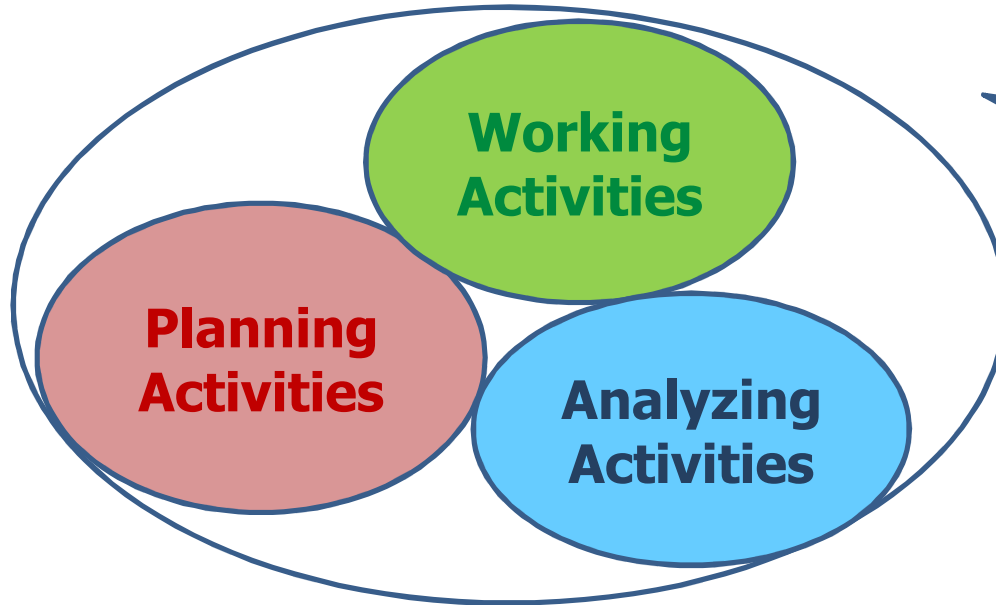
Weekly Meetings and Day-to-Day Actions

Postmortem

Typical TSP Cycle

Time →

TSP Activities



*And they develop
software too!*



TxP Planning Activities

	From The Start	Some Time Later	Get To Last
Project and Management Objectives (LAU 1)	<input checked="" type="checkbox"/>		
Team Goals and Roles (LAU 2)	<input checked="" type="checkbox"/>		
Project Strategy and Support (LAU 3)	<input checked="" type="checkbox"/>		
Overall Plan (LAU 4)	<input checked="" type="checkbox"/>		
Planned sizes and rates used to compute times (LAU 4)		<input checked="" type="checkbox"/>	
Quality Preparation (LAU 5)	<input checked="" type="checkbox"/>		
Planned Defects Injected/Removed (LAU 5)			<input checked="" type="checkbox"/>
Planned quality indicator values are acceptable (LAU 5)			<input checked="" type="checkbox"/>
Balanced Plan (LAU 6)	<input checked="" type="checkbox"/>		
Project Risk Analysis (LAU 7)	<input checked="" type="checkbox"/>		
Launch Report Preparation (LAU 8)	<input checked="" type="checkbox"/>		
Management Review (LAU 9)	<input checked="" type="checkbox"/>		
Launch Postmortem (LAU 10)	<input checked="" type="checkbox"/>		



TxP Working Activities

	From The Start	Some Time Later	Get To Last
Logging time	<input checked="" type="checkbox"/>		
Logging defects	<input checked="" type="checkbox"/>		
Tracking EV	<input checked="" type="checkbox"/>		
Using PROBE in Planning phase		<input checked="" type="checkbox"/>	
Entering actual sizes in Postmortem phase		<input checked="" type="checkbox"/>	
Defining Defect Types			<input checked="" type="checkbox"/>
Using Review checklists			<input checked="" type="checkbox"/>
Holding periodic team meetings	<input checked="" type="checkbox"/>		
Following an agenda during team meetings	<input checked="" type="checkbox"/>		
Performing/reporting on assigned roles	<input checked="" type="checkbox"/>		
Reviewing action items	<input checked="" type="checkbox"/>		
Reviewing assigned goals and risks	<input checked="" type="checkbox"/>		
Maintaining project plan and workbook	<input checked="" type="checkbox"/>		



TxP Analyzing Activities

	From The Start	Some Time Later	Get To Last
Evaluate plan vs. actual schedule hours	<input checked="" type="checkbox"/>		
Evaluate plan vs. actual component hours	<input checked="" type="checkbox"/>		
Evaluate plan vs. actual component sizes		<input checked="" type="checkbox"/>	
Evaluate team performance vs. goals and quality plan			<input checked="" type="checkbox"/>
Evaluate plan vs. actual quality of components			<input checked="" type="checkbox"/>
Update planning data for schedule hours	<input checked="" type="checkbox"/>		
Update planning data for lifecycle time-in-phase %s	<input checked="" type="checkbox"/>		
Update planning data for productivity rates		<input checked="" type="checkbox"/>	
Update planning data for defect densities		<input checked="" type="checkbox"/>	
Update planning data for defect rates and yields		<input checked="" type="checkbox"/>	
Update planning data for quality indicator thresholds			<input checked="" type="checkbox"/>



Transitions

Training & First Launch

- ✓3-part TPI Training
- ✓Process Modeling
- ✓First Launch

Product Size Definition

- ✓Define size measures
- ✓Add Planning and Postmortem phases
- ✓Begin use of PROBE

Defect Removal

- ✓Define Defect Types
- ✓Refine Processes with Defect Removal Phases

Quality Indicators

- ✓Define Product Quality Indicators
- ✓Define Process Quality Indicators

Stages

TIME-
Based

SIZE-
Based

QUALITY-
Based

TxP

Planning
Activities

Working
Activities

Analyzing
Activities



Things to Remember

- TxP may be applied to any team that has recurring work to perform
- TxP teams should plan their work, work their plans, and analyze their data to improve
- This analysis gives them insight into the quality of their processes used to produce their products and provide their services



Questions?

NAVAIR PRT

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Backup Slides



NAVAIR Team Performance



NAVAIR Team Data Profiles FY10-FY11

Num of Teams 19

Num of Teams (by type of work performed)

Tactical/Embedded Software Dev 12

Desktop Software Dev 6

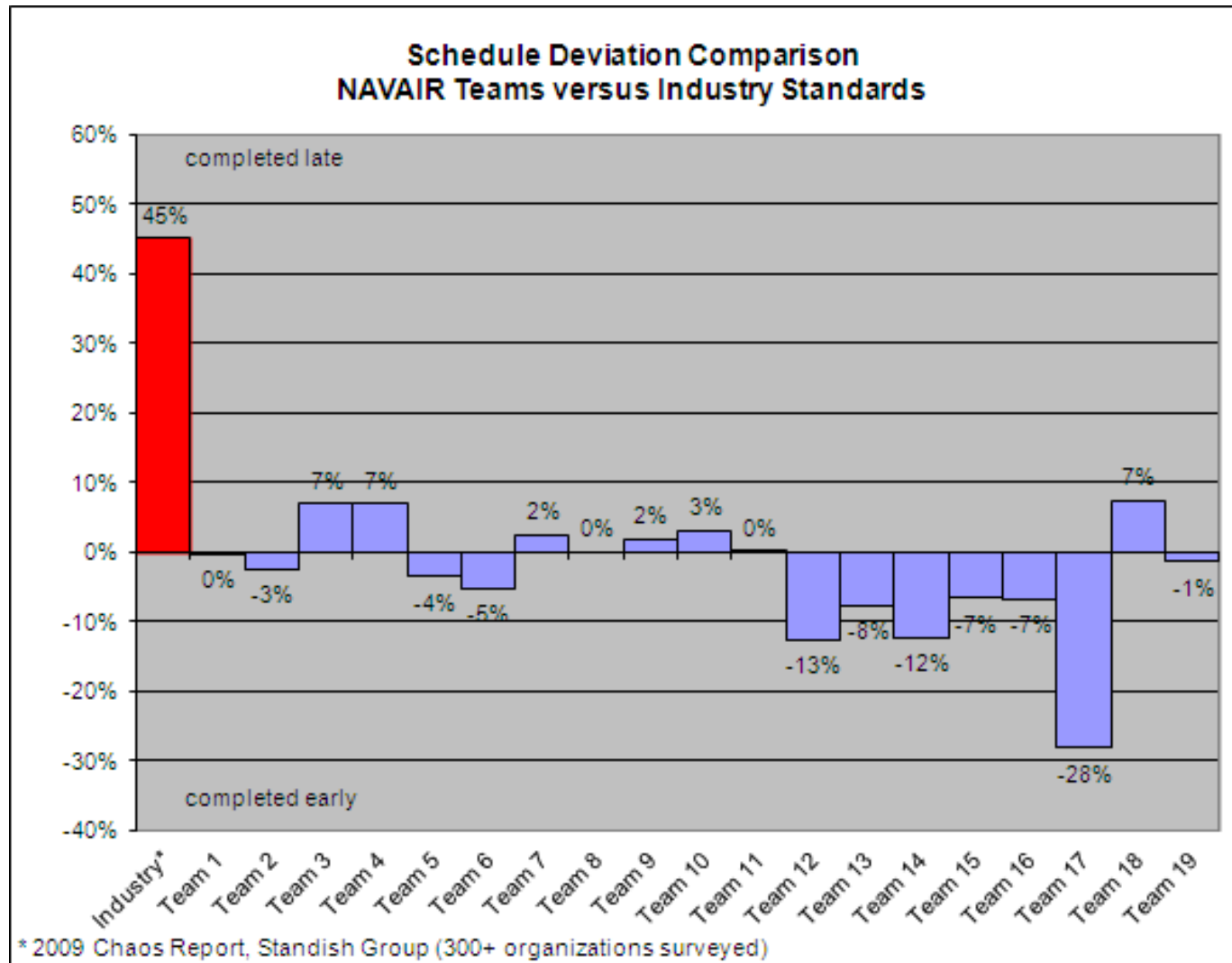
Systems Integration 1

	Min	Avg	Max
Num of Team Members	2	6	12
Performance Period (months)	4	9	18



NAVAIR Teams

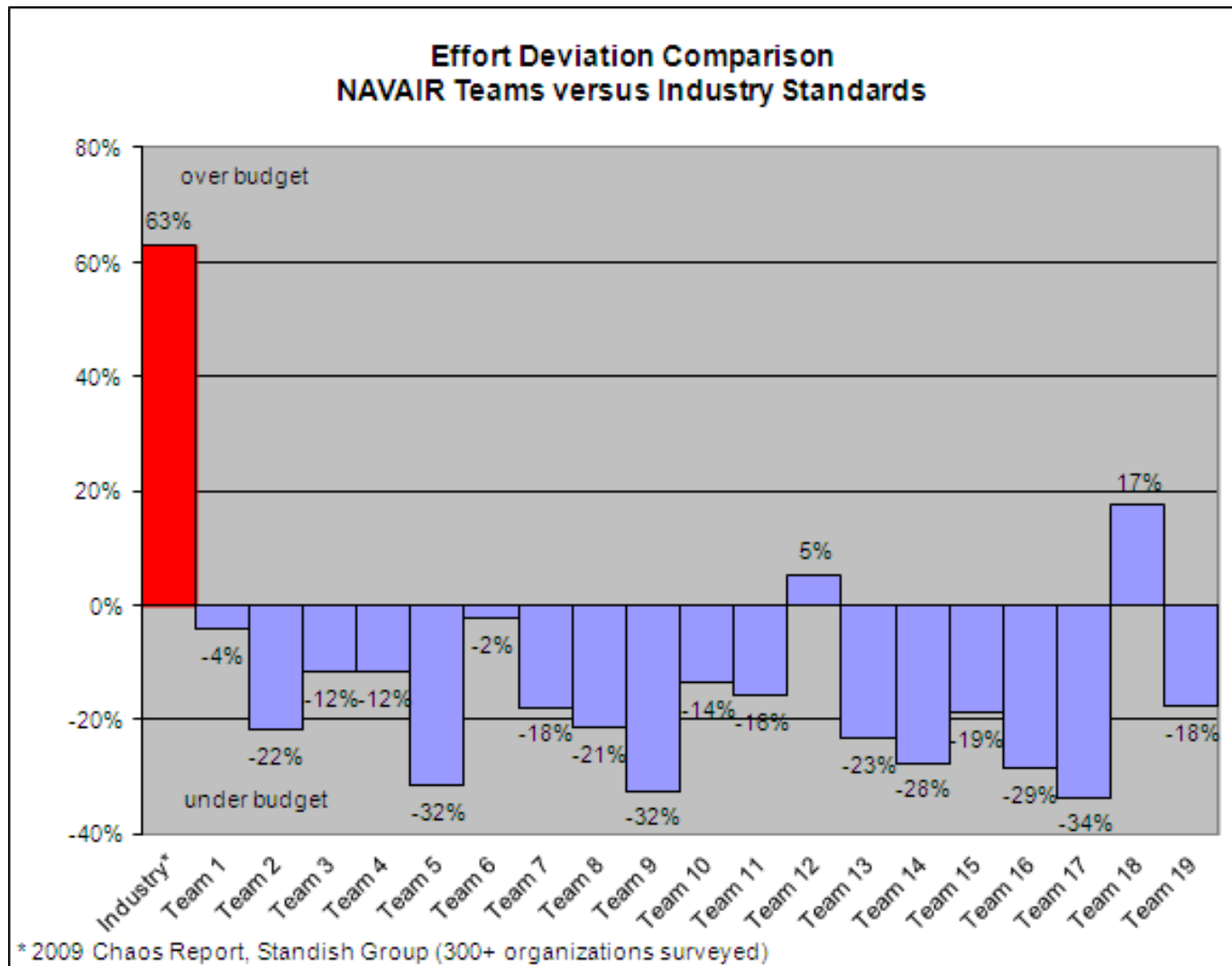
Schedule





NAVAIR Teams

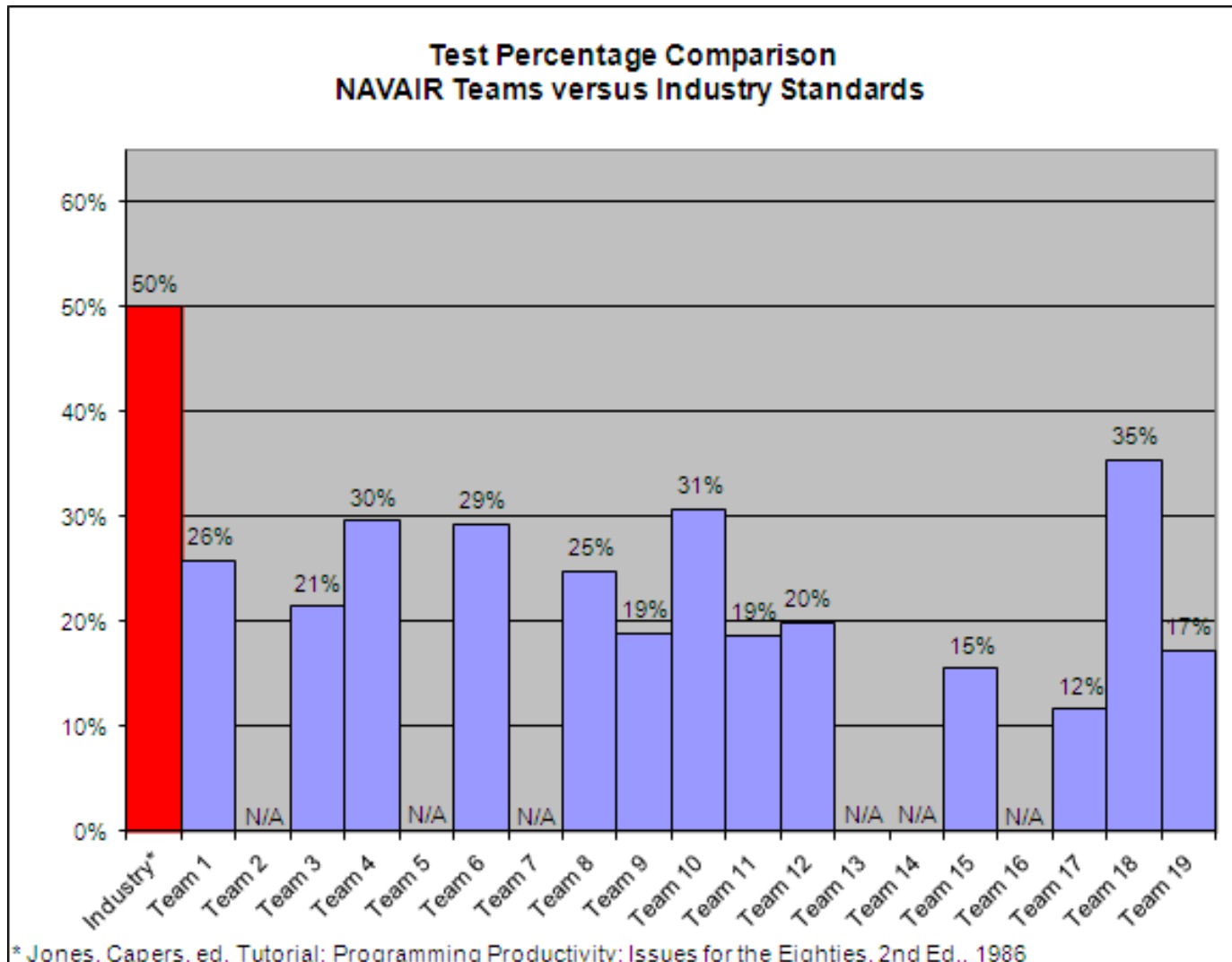
Effort Performance





NAVAIR Teams

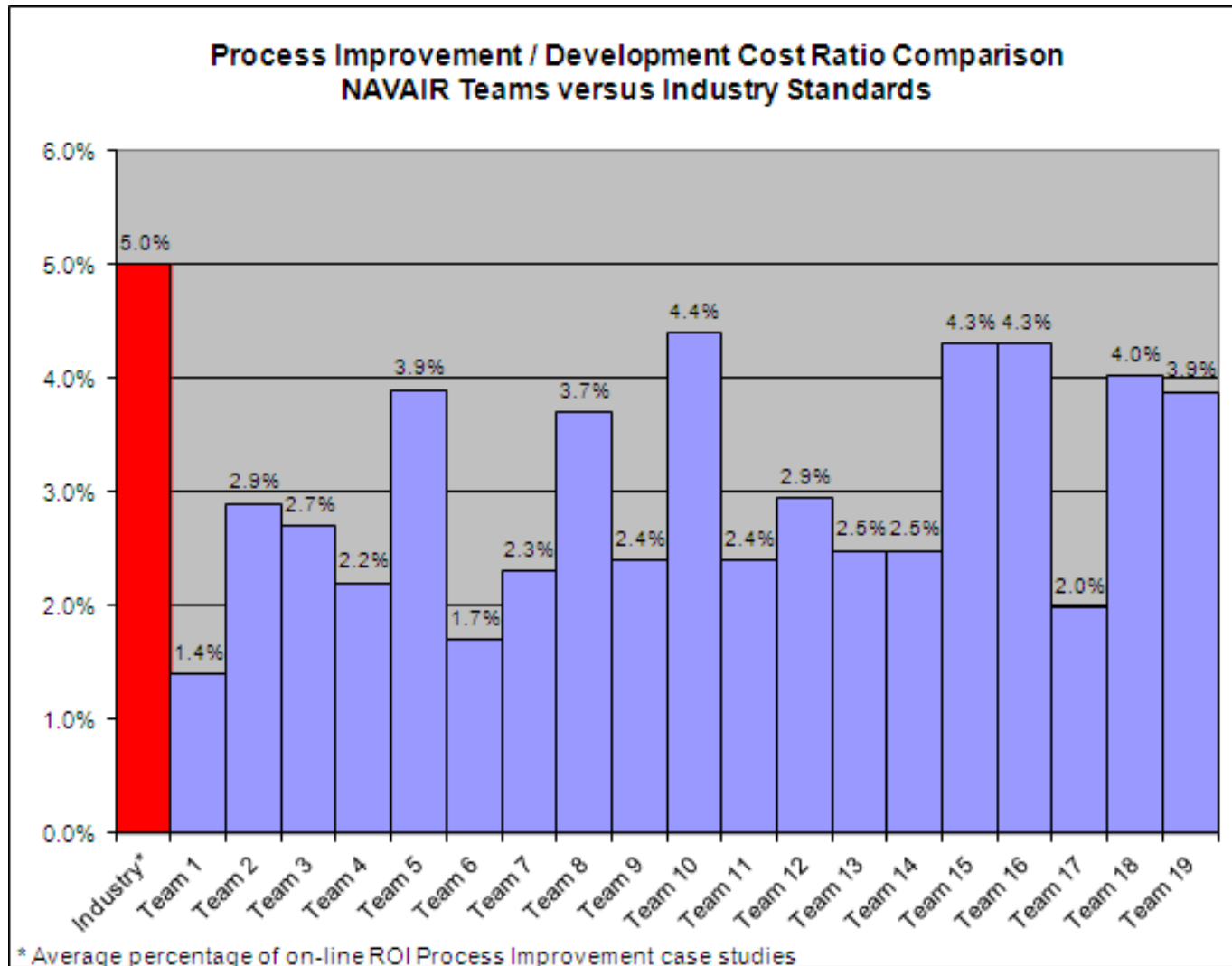
Quality in Test Time





NAVAIR Teams

Cost of Improvement





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